

(PCT Article 18 and Rules 43 and 44)

| Applicant's or agent's file reference | | of Transmittal of International Search Report |
|---|---|---|
| WOP12751A | ACTION | 220) as well as, where applicable, item 5 below. |
| International application No. | International filing date (day/month/year) | (Earliest) Priority Date (day/month/year) |
| PCT/GB 01/00007 | 02/01/2001 | 07/01/2000 |
| Applicant | | |
| SEIKO EPSON CORPORATION | | |
| SEIRO EI SON CORTORATION | | |
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| according to Article 18. A copy is being tra | n prepared by this International Searching Aut ansmitted to the International Bureau. | thority and is transmitted to the applicant |
| This International Search Report consists | of a total of sheets. | |
| X It is also accompanied by | a copy of each prior art document cited in this | s report. |
| Basis of the report | | |
| | international search was carried out on the ba ess otherwise indicated under this item. | asis of the international application in the |
| the international search w Authority (Rule 23.1(b)). | as carried out on the basis of a translation of | the international application furnished to this |
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| | nal application in written form. | |
| filed together with the inte | rnational application in computer readable for | m. |
| furnished subsequently to | this Authority in written form. | |
| furnished subsequently to | this Authority in computer readble form. | |
| the statement that the sub international application a | sequently furnished written sequence listing of s filed has been furnished. | does not go beyond the disclosure in the |
| the statement that the info furnished | rmation recorded in computer readable form | is identical to the written sequence listing has been |
| 2. Certain claims were four | nd unsearchable (See Box I). | |
| 3. Unity of invention is lack | king (see Box II). | |
| With regard to the title, | | |
| The text is approved as su | bmitted by the applicant. | |
| the text has been establis | hed by this Authority to read as follows: | |
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| 5. Will regard to the abstract, | | |
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Relevant to claim No.

1.5.8

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01L29/786 H01L21/336

C. DOCUMENTS CONSIDERED TO BE RELEVANT

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) IPC 7 H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

Category . Citation of document, with indication, where appropriate, of the relevant passages

15 November 1994 (1994-11-15)

US 5 365 080 A (YAMAZAKI SHUNPEI ET AL)

| A | figures 2,4,5 column 2, line 3 - line 34 column 2, line 67 -column 6, | line 42 | 2- 4 ,6,7, 9-12 |
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| A | US 5 382 537 A (NOGUCHI TAKA: 17 January 1995 (1995-01-17) figures 1-3 column 2, line 40 - line 48 column 3, line 4 -column 4, | | 2,3 |
| X Furt | her documents are listed in the continuation of box C. | X Patent family members are listed | in annex. |
| "A" docum consid | ategories of cited documents : ent defining the general state of the art which is not dered to be of particular relevance | 'T' later document published after the inte or priority date and not in conflict with cited to understand the principle or th | |
| "L" docum which citatio "O" docum other "P" docum | document but published on or after the international | invention '2' document of particular relevance; the cannot be considered novel or cannot involve an inventive step when the did '2' document of particular relevance; the cannot be considered to involve an in document is combined with one or ments, such combination being obvious in the art. '3' document mentines of this same plants. | eory underlying the claimed invention t be considered to current is taken alone claimed invention ventive step when the ore other such docu- us to a person skilled |

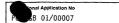
Fax: (+31-70) 340-3016

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Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Authorized officer

Polesello, P



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| A | US 5 498 904 A (HARATA YASUKI ET AL) 12 March 1996 (1996-03-12) figures 1,2,6,7 column 2, line 66 -column 3, line 30 column 3, line 57 -column 4, line 8 column 4, line 52 -column 6, line 4 column 11, line 11 -column 12, line 34 | 1-12 |
| A | PATENT ABSTRACTS OF JAPAN vol. 006, no. 185 (E-132), 21 September 1982 (1982-09-21) -& JP 57 099778 A (CITIZEN WATCH CO LTD), 21 June 1982 (1982-06-21) abstract; figures 1,2 | 1,8 |
| A | PATENT ABSTRACTS OF JAPAN vol. 1998, no. 05, 30 April 1998 (1998-04-30) -& JP 10 012886 A (HITACHI LTD), 16 January 1998 (1998-01-16) abstract; figure 5 | 1-3 |
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| JP 10012886 | Α | 16-01-1998 | NONE | |
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(19) World Intellectual Property Organization International Bureau



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(43) International Publication Date 12 July 2001 (12.07,2001)

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(10) International Publication Number WO 01/50538 A1

- 21/336
- PCT
 - (74) Agent: STURT, Clifford, Mark; Miller Sturt Kenyon, 9 John Street, London WC1N 2ES (GB).
- (21) International Application Number: PCT/GB01/00007
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- (25) Filing Language:

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(51) International Patent Classification7:

- 7 January 2000 (07.01.2000) Gl
- (71) Applicant (for all designated States except US): SEIKO EPSON CORPORATION [JP/JP]; 4-1, Nishishinjuku 2-chome, Shinjuku-ku, Tokyo 163-0811 (JP).
- (72) Inventors; and

(30) Priority Data: 0000376.4

(75) Inventors/Applicants (for US only): YUDASAKA, Ichine, [JP/JP]; Selico Egson Corporation, 3-5, Owa 3-chome, Suwa-shi, Nagano-ken 392-8502 (JP). MIYASAKA, Mitsutoshi [JP/JP]; Selico Egson Corporation, 3-5, Owa 3-Chome, Suwa-shi, Nagano-ken 392-8502 (JP). MIGLIORATO, Piero [GB/GB]; Epson Cambridge Laboratory, Sc King's Parade, Cambridge CB2 1SI (GB).

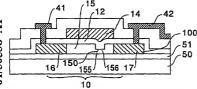
- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,
- HU, D. II., II., S., J.T., K.E., K.M., K.R., K.N., Z.L., E.L., E.K., S.L., LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, I.S, MW, M.S.D. S.L, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TI, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, MI, MR, NE, SN, TD, TG).

Published:

With international search report.

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: A THIN FILM TRANSISTOR AND A METHOD FOR MANUFACTURING THEREOF



(57) Abstract: In TFT (10), the channel region (15) towering over the gate electrode (14) through the gate instalton film (12), the source region (16) connecting to the channel (15) and the drain region (17) connecting to the channel region (15) on the opposite side of the source region (15) on the opposite side of the source region (16) are formed on the polycrystal semiconductor film (100) on which island-like patterning is performed. An indented section (155) is formed on the surface of the channel region (15), and the section corresponding to the indented section (155) becomes the recombination center (150) which captures the small-number carrier (holes) because

the degree of the crystallization is low in the section corresponding to the indented section (155) due to shift from the optimum conditions at the time of laser annealing of the semiconductor (100). Thus the invention provides a TFT and its production method which enable the stabilizing of saturation current and improving reliability by improving the filing quality of the nanneal region.

01/50520 41

PCT Application No

A. CLASSIFICATION OF SUBJECT MATTER IPC 7 H01L29/786 H01L21/336

According to international Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (dassification system followed by classification symbols) IPC 7 - H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, INSPEC, COMPENDEX

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| X Furthe | or documents are listed in the continuation of box C. | X Patent family members a | re listed in annex. |
| Special cate | gories of cited documents: | | |
| document consider document which is citation of document other me document later than | I defining the general state of the art which is not odd to be of patient serious and to be of patients and to be obtained as a patient with a patient serious and to describe the patients and t | The later document published after or priority date and not in cent cited to understand the princip invention. 2d document of particular nelwana cannot be considered novel or involve an inventive step when the constant of particular relevant document is contained with the contained of particular relevant document is contained with or ments, such combination bein in the art. 2d document member of the same | uct with the application but does not not underlying the look or theory underlying the call t |
| ate of the act | tual completion of the international search | Date of mailing of the internation | |
| | February 2001 | 06/03/2001 | |
| ume and mai | lling address of the ISA European Patent Office, P.B. 5818 Patentiaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, | Authorized officer | |
| | Fax: (+31-70) 340-3016 | Polesello, P | |

INTERNATION RCH REPORT



| Category ° | ation) DOCUMENTS CONSIDERED TO BE RELEVANT Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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| A | US 5 893 730 A (KOYAMA JUN ET AL) 13 April 1999 (1999-04-13) figures 1,3 column 2, line 12 -column 3, line 35 column 4, line 1 - line 20 column 5, line 60 -column 8, line 14 | 4-7,9-12 |
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Inter Application No PCT 01/00007

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PATENT COOPERATION TREATY

| From the INTERNATIONAL SEARCHING AUTHORITY | | PCT . | | | |
|--|---|--|--|--|--|
| To: MILLER STURT KENYON Attn. Sturt, Clifford Mark 9 John Street London WCIN 2ES UNITED KINGDOM RILLER STURT | 01 | NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION (PCT Rule 44.1) | | | |
| | Date of mai (day/month | | | | |
| Applicant's or agent's file reference WOP12751A | FOR FUR | THER ACTION See paragraphs 1 and 4 below | | | |
| International application No. PCT/GB 01/00007 | Internationa (day/month | | | | |
| Applicant SEIKO EPSON CORPORATION | | | | | |
| The applicant is hereby notified that the International Search Report has been established and is transmitted herewith. Filling of amendments and statement under Article 19: The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46): When? The time limit for filing such amendments is normally 2 months from the date of transmittal of the International Search Report, however, for more details, see the notes on the accompanying sheet. | | | | | |
| Where? Directly to the International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Fascimile No.: (41–22) 740.14.35 | | | | | |
| For more detailed instructions, see the notes on the accordance | | | | | |
| The applicant is hereby notified that no International Search Article 17(2)(a) to that effect is transmitted herewith. | Report will b | e established and that the declaration under | | | |
| With regard to the protest against payment of (an) addition the protest together with the decision thereon has been applicant's request to forward the texts of both the protest. | transmitted | to the International Bureau together with the | | | |
| no decision has been made yet on the protest; the app | licant will be i | notified as soon as a decision is made. | | | |
| 4. Further action(s): The applicant is reminded of the following: Shortly after 18 months from the priority date, the international ap- if the applicant wishes to avoid or postpone publication, a notice priority citiam, must reach the International Bureau as provided I completion of the technical preparations for international publica. | of withdrawa n Rules 90bis | of the international application, or of the | | | |
| Within 19 months from the priority date, a demand for international wishes to postone the entry into the national phase until 30 mo Within 20 months from the priority date, the applicant must perior before all designated Offices which have not been elected in the priority date or could not be elected because they are not bound | nths from the m the prescri e demand or i | priority date (in some Offices even later). bed acts for entry into the national phase n a later election within 19 months from the | | | |
| Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentiaan 2 Name 2280 HV Riginol, Tx. 31 651 epo nl, Fac. (3-170) 340-2040, Tx. 31 651 epo nl, Fac. (3-170) 340-3016 | Authorized of Audrey | officer Rummery | | | |

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PATENT COOPERATION TREATY

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| WOP12751A | ACTION (Form PCT/ISA/2 | 220) as well as, where applicable, item 5 below. |
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| International application No. | International filing date (day/month/year) | (Earliest) Priority Date (day/month/year) |
| PCT/GB 01/00007 | 02/01/2001 | 07/01/2000 |
| Applicant | * | <u> </u> |
| SEIKO EPSON CORPORATION | | |
| according to Article 18. A copy is being tra | _ | hority and is transmitted to the applicant |
| This International Search Report consists X It is also accompanied by | of a total of 3 sheets. a copy of each prior art document cited in this | report |
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| was carried out on the basis of the contained in the internation filed together with the inter | d/or amino acid sequence disclosed in the in sequence listing: and application in written form. rnational application in computer readable for this Authority in written form. | nternational application, the international search |
| | this Authority in computer readble form. | |
| | sequently furnished written sequence listing d | loes not go beyond the disclosure in the |
| 1 — | | s identical to the written sequence listing has been |
| 2. Certain claims were foun | nd unsearchable (See Box I). | |
| 3. Unity of invention is lack | ing (see Box II). | |
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| the text is approved as sub | ned by this Authority to read as follows: | |
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| 5. With regard to the abstract, | | |
| X the text is approved as sub | omitted by the applicant. | |
| the text has been establish within one month from the | ned, according to Rule 38.2(b), by this Authori date of mailing of this international search rep | ty as it appears in Box III. The applicant may, port, submit comments to this Authority. |
| 6. The figure of the drawings to be publis | | 1 |
| X as suggested by the applic | ant. | None of the figures. |
| because the applicant faile | d to suggest a figure. | |
| because this figure better of | characterizes the invention. | |

International Application No PCT/GB 01/00007

Relevant to claim No.

1,5,8

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H01L29/786 H01L21/336

C. DOCUMENTS CONSIDERED TO BE RELEVANT

figures 2,4,5 column 2. line 3 - line 34

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols) IPC $\frac{7}{100}$ H01L

Category Citation of document, with indication, where appropriate, of the relevant passages

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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| column 2, line 67 -column 6, 1 | line 42 | 2-4,6,7, 9-12 |
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| A V US 5 382 537 A (NOGUCHI TAKASH 17 January 1995 (1995-01-17) figures 1-3 column 2, line 40 - line 48 column 3, line 4 -column 4, li | | 2,3 |
| | -/ | |
| Further documents are fisted in the continuation of box C * Special categories of cited documents: **A** document defining the general state of the art which is not considered to be of particular relevance. **E** earlier document but published on or after the International filling date. **U** document which may throw doubts on priority claim(s) or which so clear to establish the published of another which is clear to establish the published of another which is clear to establish the published of another or which is clear to establish the published of another means. **Of document referring to an oral disclosure, use, exhibition or other means. **Pr document published prior to the international filling date but later than the promy detect earliered. | Patent family members are listed of profits of the control of profits and and not in conflict with cated to understand the principle or it invention understand the principle or it invention. "Cannot be considered nevel or cannot involve an inventive step when the or cannot be considered or when the cannot be considered to whole an inventive step when the or cannot be considered to whole an inventive step when the cannot be considered to whole and involve and involve and involve and invention of particular relevance, the cannot be considered to whole and in the art. "A" document member of the same paten | emational filing date. The application but above moderning the application but above underlying the claimed invention to be considered to occurrent is taken alone claimed invention revenities also when the claimed invention to be considered to be above the claimed invention to the claimed inven |
| Date of the actual completion of the international search 27 February 2001 | Date of mailing of the international se | earch report |
| Name and mailting address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel (-31-70) 340-2040, Tx. 31 651 epo nl, Fax: (-31-70) 340-3016 | Authorized officer Polesello, P | |

International Application No

| | | PCT/GB 01/00007 |
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| | ation) DOCUMENTS CONSIDERED TO BE RELEVANT | |
| ategory * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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